Sources of Additional Information
For information on certification programs, contact:
☛ Computing Technology Industry Association, 450 East 22nd St., Suite 230, Lombard, IL 60148-6158.
Internet: **http://www.comptia.org**
☛ The International Society of Certified Electronics Technicians, 2708 West Berry St., Fort Worth, TX 76109. Internet: **http://www.iscet.org**
☛ Electronics Technicians Association, 602 North Jackson, Greencastle, IN 46135. Internet: **http://www.eta-sda.com**

Electronic Home Entertainment Equipment Repairers

(O*NET 85708)

Significant Points

- Job opportunities will be best for applicants with a basic knowledge of electronics, as well as repair experience.
- Employment of repairers is expected to decline because it is often cheaper to replace equipment rather than pay for repairs.

Nature of the Work
Electronic home entertainment equipment repairers, also called *service technicians*, repair a variety of equipment, including televisions and radios; stereo components; video and audio disc players; video cameras; and videocassette recorders. They also repair home security systems, intercom equipment, and home theater equipment, consisting of large-screen televisions and sophisticated, surround-sound systems.

Customers usually bring small, portable equipment to repair shops for servicing. Repairers at these locations, known as *bench technicians*, are equipped with a full array of electronic tools and parts. When larger, less mobile equipment breaks down, customers may pay repairers to come to their homes. These repairers, known as *field technicians*, travel with a limited set of tools and parts, and attempt to complete the repair at the customer's location. If the repair is complex, technicians may bring defective components back to the repair shop for a thorough diagnosis and repair.

When equipment breaks down, repairers check for common causes of trouble, such as dirty or defective components. Many repairs consist of simply cleaning and lubricating equipment. For example, cleaning the tape heads on a videocassette recorder will prevent tapes from sticking to the equipment. If routine checks do not locate the trouble, repairers may refer to schematics and manufacturers' specifications that provide instruction on how to locate problems. Repairers use a variety of test equipment to diagnose and identify malfunctions. Multimeters measure the voltage and resistance of the power supply; color bar and dot generators provide on-screen test patterns; signal generators provide test signals; and oscilloscopes measure complex waveforms produced by electronic equipment. Repairers use handtools such as pliers, screwdrivers, soldering irons, and wrenches to replace faulty parts. They also make adjustments to equipment, such as focusing and converging the picture of a television set or balancing the audio on a surround-sound system.

Most electronic home entertainment equipment repairers work in retail stores or repair shops.

Improved technologies have decreased the price of electronic home entertainment equipment. As a result, customers often replace broken equipment instead of repairing it.

Working Conditions
Most repairers work in well-lighted electrical repair shops. Field technicians, however, spend much time traveling in service vehicles and working in customers' residences.

Repairers may have to work in a variety of positions and carry heavy equipment. Although the work of repairers is comparatively safe, they must take precautions against minor burns and electric shock. As television monitors carry high voltage even when turned off, repairers need to discharge the voltage, before servicing such equipment.

Employment
Electronic home entertainment equipment repairers held about 36,000 jobs in 1998. Most repairers work in stores that sell and service electronic home entertainment products, or in electrical repair shops and service centers. About 1 in 5 electronic home entertainment equipment repairers was self-employed.

Training, Other Qualifications, and Advancement
Employers prefer applicants who have basic knowledge and skill in electronics. Applicants should be familiar with schematics and have some hands-on experience repairing electronic equipment. Many applicants gain these skills at vocational training programs and community colleges. Some learn from working with electronic equipment as a hobby. Entry level repairers may work closely with more experienced technicians who provide technical guidance.

Field technicians work closely with customers and must have good communications skills and a neat appearance. Employers may also require that field technicians have a driver's license.

The International Society of Certified Electronics Technicians (ISCET) and the Electronics Technicians Association (ETA) administer certification programs for electronics technicians. Repairers may specialize in a variety of skill areas, including consumer electronics. To receive certification, repairers must pass qualifying exams corresponding to their level of training and experience. Both programs offer associate certifications to entry level repairers.

Experienced repairers with advanced training may become specialists or troubleshooters, who help other repairers diagnose difficult problems. Workers with leadership ability may become supervisors of other repairers. Some experienced workers open their own repair shops.

Job Outlook
Employment of electronic home entertainment equipment repairers is expected to decline through 2008, due to decreased demand for repair work. Some job openings will occur, however, as repairers retire or gain higher paying jobs in other occupations requiring electronics experience. Opportunities will be best for applicants with hands-on experience and knowledge of electronics.

The need for repairers is declining because home entertainment equipment is less expensive than in the past. As technological developments have lowered equipment prices, the demand for repair services has decreased. When malfunctions do occur, it is often cheaper for consumers to replace equipment, rather than to pay for repairs.

Employment of repairers will continue to decline, despite the introduction of sophisticated equipment, such as digital televisions. As long as the price of such equipment remains high, purchasers will be willing to hire repairers when malfunctions occur. However, the need for repairers to maintain this costly equipment will not be great enough to offset the overall decline in demand.

Earnings

Median hourly earnings of electronic home entertainment equipment repairers were $11.32 in 1998. The middle 50 percent earned between $8.90 and $14.59. The lowest 10 percent earned less than $6.82 and the highest 10 percent earned more than $18.59. Median hourly earnings in the industries employing the largest number of electronic home entertainment equipment repairers in 1997 are shown below:

Electrical repair shops	$11.40
Radio, television, and computer stores	11.00

Related Occupations

Other workers who repair and maintain electronic equipment include broadcast and sound technicians; computer, automated teller, and office machine repairers; electronics repairers, commercial and industrial equipment; and telecommunications equipment mechanics, installers, and repairers.

Sources of Additional Information

For information on careers and certification, contact:

☛ The International Society of Certified Electronics Technicians, 2708 West Berry St., Fort Worth, TX 76109. Internet: **http://www.iscet.org**

☛ Electronics Technicians Association, 602 North Jackson, Greencastle, IN 46135. Internet: **http://www.eta-sda.com**

Electronics Repairers, Commercial and Industrial Equipment

(O*NET 85717A and 85717B)

Significant Points

- Job opportunities will be best for applicants with a thorough knowledge of electronics, as well as repair experience.
- Growth will result from the increasing use of commercial and industrial electronic equipment as businesses strive to lower costs by implementing automation.

Nature of the Work

Businesses and other organizations depend on complex electronic equipment for a variety of functions. Industrial controls automatically monitor and direct production processes on the factory floor. Transmitters and antennae provide communications links for many organizations. The Federal Government uses radar and missile control systems to provide for the national defense. These complex pieces of electronic equipment are installed, maintained, and repaired by electronics repairers of commercial and industrial equipment.

Many repairers, known as *field technicians*, travel to factories or other locations to repair equipment. These workers often have assigned areas where they perform preventive maintenance on a regular basis. When equipment breaks down, field technicians go to a customer's site to repair the equipment. *Bench technicians* work in repair shops located in factories and service centers. They work on components that cannot be repaired on the factory floor.

Some industrial electronic equipment is self-monitoring and alerts repairers to malfunctions. When equipment breaks down, repairers first check for common causes of trouble, such as loose connections or obviously defective components. If routine checks do not locate the trouble, repairers may refer to schematics and manufacturers' specifications that show connections and provide instructions on how to locate problems. Repairers use software programs and testing equipment to diagnose malfunctions. Multimeters measure voltage, current, and resistance; signal generators provide test signals; and oscilloscopes graphically display signals. Repairers also use handtools such as pliers, screwdrivers, soldering irons, and wrenches, to replace faulty parts and to adjust equipment.

Repairers of electronic commercial and industrial equipment adjust and calibrate equipment.

Because component repair is complex, and factories cannot allow production equipment to stand idle, repairers on the factory floor usually replace defective units, such as circuit boards, instead of fixing them. Defective units are usually sent back to the manufacturer or to a specialized repair shop for repair. Bench technicians at these locations have the training, tools, and parts to thoroughly diagnose and repair components. These workers also locate and repair circuit defects, such as poorly soldered joints on circuit boards. Electronics repairers of commercial and industrial equipment often coordinate their efforts with other workers installing and maintaining equipment. (See the statements on industrial machinery repairers and millwrights elsewhere in the *Handbook.*)

Working Conditions

Many repairers work on factory floors where they are subject to noise, dirt, vibration, and heat. Bench technicians work primarily in repair shops where the surroundings are relatively quiet, comfortable, and well lighted. Field technicians spend much time on the road, traveling to different customer locations.

Because electronic equipment is critical to industries and other organizations, repairers work around the clock. Their schedules may include evening, weekend, and holiday shifts; shifts may be assigned on the basis of seniority.

Repairers may have to do heavy lifting and work in a variety of postures. They must follow safety guidelines and often wear protective goggles and hardhats. When working on ladders or on elevated equipment, repairers must wear harnesses to prevent falls. Before repairing a piece of machinery, these workers must follow procedures to insure that others cannot start the equipment during the repair process. They must also take precautions against electric shock by locking off power to the unit under repair.

Employment

Electronics repairers of commercial and industrial equipment held about 72,000 jobs in 1998. About 1 out of 5 salaried repairers was employed by the Federal Government—almost all by the Department of Defense at military installations around the country. Many repairers also worked